

Student Worksheet

Name(s): _____

Section: _____
Date: _____

Simple Machines Activity 1: The wedge and lever

Getting Started: Shape of the wedge

With your lab partner, predict how the shape (proportion) of the wedge might influence its effectiveness.

Lab Instructions

Select a length for your wedge. The width will remain at 12 cm.

Record the length of your first wedge, the force that was applied, and indicate whether or not it was successful.

Repeat this using 6 to 8 different lengths.

Data Collection

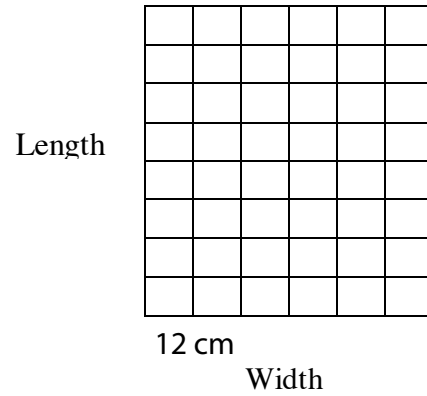
Table 1: Wedge

Length (cm)	Width (cm)	Force (N)
	12	
	12	
	12	
	12	
	12	
	12	
	12	

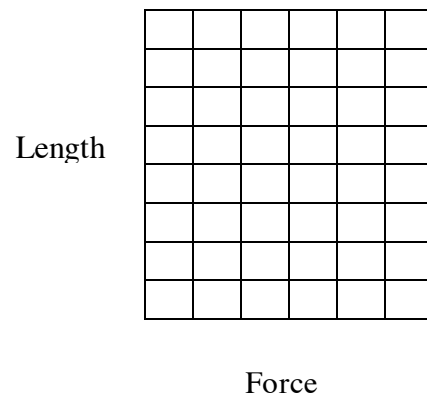
Do you notice any patterns to help you predict what wedge sizes will split the stone?

Write a general statement explaining which wedges will work most efficiently.

To look at this information in another way make a line graph showing the wedge dimensions you have tested.



Use a second graph to look at the force required for all wedges you tested.



Analysis Questions:

1. Using the data from your chart and your graph, write a general statement about the length and width of the wedges that did the work most efficiently.

2. Make a prediction of what might happen with extreme shaped wedges. i.e.: an extremely long wedge or a very short almost flat wedge. Might there be problems at both extremes? Explain your prediction.

3. How did the force which was applied to the wedge change as you changed the length of the wedge?

4. What is the relationship between the wedge length and the force required to use it?

5. Refer back to your prediction at the beginning of this lab. How might you change your statement to be more accurate or more complete?

Let's move on to the lever:

Getting Started:

1. Briefly state what you know about levers and work. Don't write a whole book.

2. How will a lever make lifting the block onto the sled easier?

Lab Instructions Continued

1. Select a placement for the fulcrum and record your data.
2. Record effort distance, effort force and indicate whether or not it was successful.
3. Repeat using various fulcrum placements.

Data Collection

Table 2: Lever

Effort Distance	Effort Force	Success

Predict fulcrum placements which will not be successful. Explain why you think these placements won't be successful. Use complete sentences.

Test your prediction (hypothesis). Do you want to add to your prediction or change it a little?

Use your data from table 2 to create a table showing work done.

Table 3

Effort Distance (m)	X Effort Force (N)	= Work (J)

What do you notice about the amount of work done in each successful trial?

4. Compare the effort distance (D_E) and effort force (F_E) in all trials. What happens to the amount of F_E as the D_E increases?

5. Use the term “inverse” or “direct” to explain the relationship between F_E and D_E as you adjusted your lever. (Use complete sentences)

6. What are the advantages of using a lever to lift this stone?

Use the same data again to complete table 4 which will help us look at mechanical advantage.

Table 4

F_R	/	F_E	=	MA	D_E	/	D_R	=	MA

When you have filled in the data calculate the MA both ways for each successful test.

7. What conclusions can you draw from comparing the MA using the forces and the MA using distances for each trial.

8. Comparing different trials:

As the effort distance (D_E) increases:

What happens to the MA?

What happens to the effort force?

9. Create a statement explaining the advantage of using a lever to lift a heavy mass.

10. Refer back to your prediction at the beginning of this lab. How might you change your statement to be more accurate or complete?

11. Brainstorm a list of ways a lever might be used in your world today.